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2013 REU Poster: Synthetic Utilization and Exploration of Gallium

Synthetic Utilization and Exploration of Gallium

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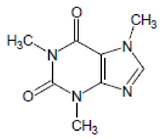
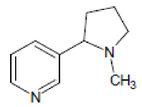
Introduction

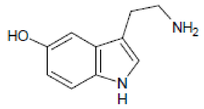
Pursuit of naturally occurring compounds or those resembling natural compounds is a major interest to organic chemistry. These compounds can contribute to humanity in multiple application. Many compounds used in society are known as heterocyclic compounds. A heterocyclic compound is one which contains at least 2 ring structures that are atomically different.[1] Common examples of naturally occurring heterocyclic structures regularly are caffeine, nicotine, and serotonin.



Caffeine



Nicotine



Serotonin

Figure 1- Commonly known heterocyclic structures found in nature.

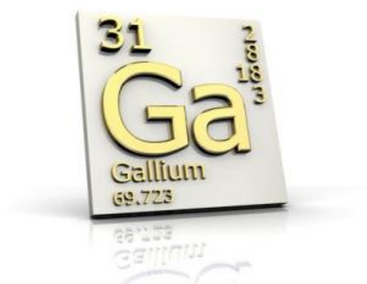
CMLD-BU Goals:

1)Discover new organic reactions and technologies to synthesize complex molecules quickly, easily and efficiently

2) Use these new reactions and technologies to synthesize combinatorial libraries of complex compounds

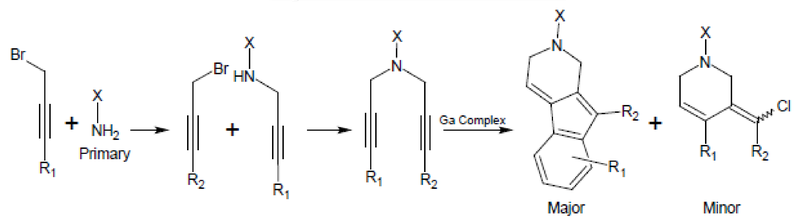
3) Distribute compound libraries to biologists and doctors, who screen for biological activity

Within organic chemistry there are numerous techniques employed to successfully synthesize heterocyclic compounds. The goal of this research was to explore the element known as gallium in heterocyclic compound formation. Gallium was selected primarily due to its general absence in the literature for double Friedel-Craft reaction potential.



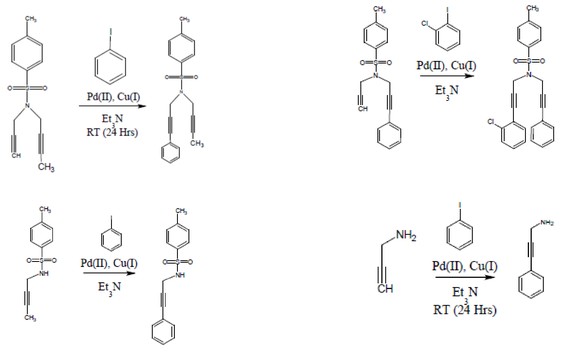
NIH National Institutes of Health
Turning Discovery Into Health

Synthesis Overview

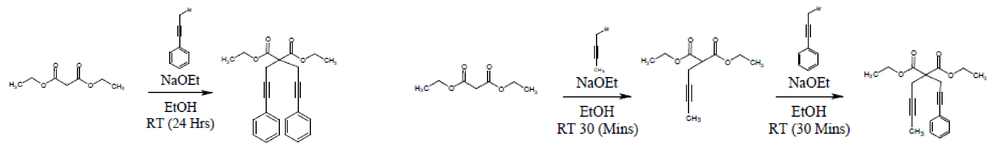


Precursor Reactions

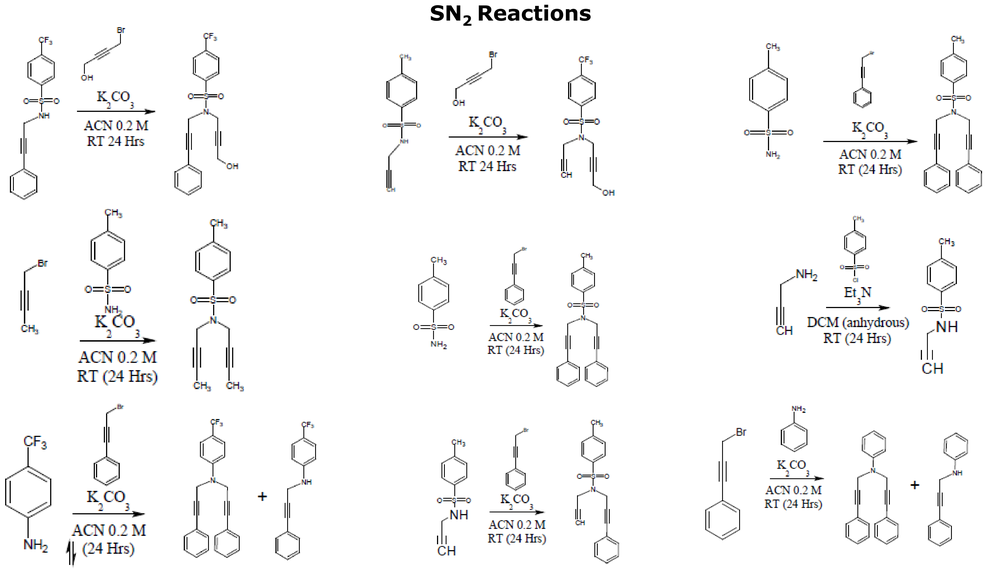
Sonogashira Cross-coupling Reaction



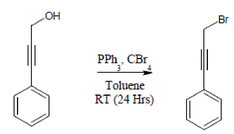
Diethyl ether di-alkylation



SN_2 Reactions

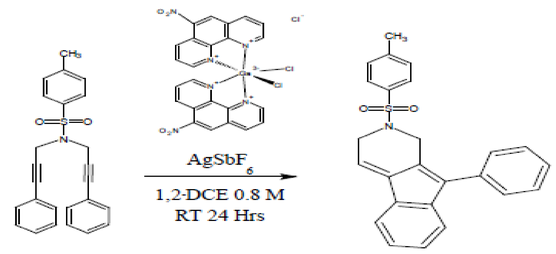


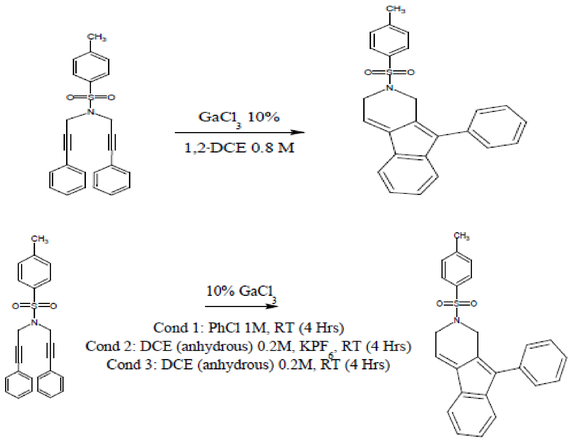
Appel Reaction



Primary Point of Interest

Double Friedel-Crafts Cyclization Chemistry





Conclusion

Use of Gallium in double Friedel-Craft cyclization reactions is a technique generally nonexistent in the literature. Future exploration of this chemistry will include reaction condition optimization with a primary focus on catalyst detail. Analog incorporation into CMLD library will be also included.

Acknowledgment

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References

1. http://www.medicalglossary.org/chemicals_and_drugs_heterocyclic_compounds_definitions.html

CMLD